

PATENT

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FOR

TRAILER HAVING IMPROVED SIDE WALL

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Background of the Invention

[001] This is a continuation of U.S. Application Number 10/308,611, filed December 2, 2002, which is a division of U.S. Application Number 09/909,065, filed July 19, 2001 (now U.S. Patent 6,497,451), the entire disclosure of each of which is incorporated by reference herein.

[002] A wide variety of trailers are known for carrying cargo. For example, van type trailers typically include a deck assembly supported by a side wall structure, wheels and front legs. The deck assembly may include longitudinal floor boards and transverse cross-members, such as I-beams, extending between opposing bottom rails. The deck transfers its load to the bottom rails, wheels, and, depending upon whether or not the trailer is coupled to a tractor or is free-standing, to a tractor fifth wheel or to retractable front legs on the trailer.

[003] In a monocoque type trailer, individual interior side wall panel members and an outer skin are joined together, often by a post, channel or zee-shaped structural member, and to a subframe to form a self-supporting body construction. The outer skin and inner panel members may carry some of the stresses between the posts, floor and roof of the trailer.

[004] For example, it is known for the interior panels and the outer skin to attach to a plurality of vertical posts spaced apart along the trailer side wall. Referring to the cross-sectional view of a prior art vertical post shown in Figure 1, a vertical post 1 includes a longitudinal central section 2 and a pair of first longitudinal flanges 3 disposed on either side of central section 2 and recessed from central section 2 between the central section and an outer skin 4. The outer skin is fastened to a pair of second longitudinal flanges 5 by any suitable means, such as rivets (not shown). Side wall liner panels 6 are attached to the posts at first longitudinal flanges 3 by tapit pins 7.

[005] It is known to include a scuff band along the interior surface of a trailer wall to prevent damage to the wall when cargo is loaded into or removed from the trailer. If provided, the protective scuff band generally protrudes into an otherwise useable storage area within the trailer.

Summary of the Invention

[006] The present invention recognizes and addresses the foregoing considerations, and others, of prior art construction and methods. Accordingly, it is an object of the present invention to provide an improved trailer.

[007] This and other objects are achieved by a trailer having a floor and first side wall that extends vertically

upward from a side edge of the floor. The side wall includes a plurality of elongated vertical posts. Each post defines a longitudinal interior surface with a first portion disposed in a generally common plane and a second portion recessed from the plane. A scuff band is received within the recessed portions so that an interior facing surface of the scuff band is generally coplanar with or inward of the side wall's interior surface.

[008] The accompanying drawings, which are incorporated in and constitute a part of this specification, illustrate one or more embodiments of the invention and, together with the description, serve to explain the principles of the invention.

Brief Description of the Drawings

[009] A full and enabling disclosure of the present invention, including the best mode thereof directed to one of ordinary skill in the art, is set forth in the specification, which makes reference to the appended drawings, in which:

[0010] Figure 1 is a cross-sectional view of a prior art side wall post;

[0011] Figure 2 is a partial perspective view of a trailer constructed in accordance with an embodiment of the present invention;

[0012] Figure 3 is a partial plan view of the interior of a side wall constructed in accordance with an embodiment of the present invention;

[0013] Figure 4 is a partial plan view of the interior of a side wall constructed in accordance with an embodiment of the present invention;

[0014] Figure 5 is a partial cross-sectional view of a trailer floor, bottom rail, top rail, and side wall with recessed scuff band constructed in accordance with an embodiment of the present invention;

[0015] Figure 6A is a perspective view of a bottom portion of a vertical side wall post showing a recessed portion of the post constructed in accordance with an embodiment of the present invention;

[0016] Figures 6B-6D show cross-sectional views of side wall posts in accordance with embodiments of the present invention;

[0017] Figures 7A-7D show cross-sectional views of side wall posts in accordance with embodiments of the present invention;

[0018] Figure 8 is a partial cross-sectional view of a reinforcing channel pressed into a side panel as in Figures 7B and 7C;

[0019] Figure 9 is a partial cut-away plan view of side wall as shown in Figure 7B; and

[0020] Figure 10 is a partial plan view of the interior of a side wall constructed in accordance with an embodiment of the present invention.

[0021] Repeat use of reference characters in the present specification and drawings is intended to represent same or analogous features or elements of the invention.

Detailed Description of Preferred Embodiments

[0022] Reference will now be made in detail to presently preferred embodiments of the invention, one or more examples of which are illustrated in the accompanying drawings. Each example is provided by way of explanation of the invention, not limitation of the invention. In fact, it will be apparent to those skilled in the art that modifications and variations can be made in the present invention without departing from the scope or spirit thereof. For instance, features illustrated or described as part of one embodiment may be used on another embodiment to yield a still further embodiment. Thus, it is intended that the present invention covers such modifications and variations as come within the scope of the appended claims and their equivalents.

[0023] Figure 2 illustrates a trailer 8 having a floor 10, two side walls 12 and a roof 16. Each side wall 12 is identically constructed. Thus, while the present discussion generally refers to one side wall, it should be understood that such structure is included in each side wall. Roof 16 is attached to side walls 12 by top rails 18, and each side wall is connected to floor 10 by a bottom rail 22 (one of which is shown

in Figure 2). The trailer includes retractable legs 24, a forward end wall 26 and a rearward end frame 28. Once assembled, the roof, floor and side walls form a trailer having a generally rectangular cross-section when viewed from the rear. The distance between inner surfaces of each side wall 12 is generally greater than 90 inches, and the distance between outer surfaces of each side wall 12 is generally less than 110 inches.

[0024] A pair of doors 30 at the trailer's rearward end are pivotally connected to rear end frame 28. A plurality of wheels 34 support the trailer's rearward end and facilitate movement of the trailer when coupled to a tractor (not shown).

[0025] Referring also to Figures 3 and 9, side wall 12 includes a plurality of vertical posts 36, a plurality of interior side wall liner panels 38 and one or more scuff bands 40. The liner panels interconnect the posts, and the scuff band is received within a recessed portion 80 of a bottom portion of posts 36. Each post includes a longitudinal front face 78 through which is defined a series of apertures 42 (not shown in Fig. 9) for receipt of cargo straps and the like to secure the trailer contents.

[0026] Panels 38 are fastened at 46 to posts 36 by screws, rivets, tapit pins, or any other suitable method. The panels are constructed of plywood or other suitable materials, for example steel. Referring specifically to Figures 7B, 7C, 8 and

9, corrugated metal panels include a plurality of recessed channels 48 that give the panels added structural strength and stiffness.

[0027] Referring again to Figure 3, posts 36 are fastened to top rail 18 by suitable means such as rivets, screws or the like. Thus, the panels are secured to the top rail through their connection to the posts. An outer skin 21 (Figure 2) is fastened to the trailer's top and bottom rails as discussed in more detail below. Referring also to Figure 5, the portion of the top rail to which the posts are fastened extends behind liner panels 38 as the panels are illustrated in Figure 3. Thus, it should be understood that Figure 3 illustrates only an upper portion of top rail 18.

[0028] In another embodiment illustrated in Figure 4, side wall 12 includes horizontally oriented interior side wall liner panels 58 fastened to horizontal logistic tracks 60 by a suitable fastening means at 62. Top rail 18 may be separately fastened to the horizontal panels. Logistic tracks 60 are fastened to vertical posts 36 (in phantom) disposed intermittently along the trailer side wall between liner panels 58 and the outer skin. Panels 58, particularly the uppermost and lowermost panels, may also be fastened to vertical posts 36. Scuff band 40, which is fastened to vertical posts 36, may be corrugated or otherwise profiled or flat, but its inner face is

generally coplanar with an interior surface of panels 58 and an interior face 78 of horizontal tracks 60.

[0029] Still referring to Figure 4, vertical posts 36 are fastened to outer skin 21 (Figures 7A-7D) and to the top and bottom rails. Liner panels 58 may be of a wooden, polymer, composite or metallic construction. They may be attached to the tracks in any suitable manner, for example to longitudinal flanges recessed from, and on either side of, front face 78. Alternatively, tracks 60 may include multiple recessed flanges as described below with reference to Figures 7A-7D, particularly where the liner panels are corrugated.

[0030] As illustrated in Figures 2-5, scuff band 40 is of a generally corrugated metal construction. However, the scuff band may be constructed of any suitable material, for example wood, with or without a protective metal plate attached, or a non-corrugated metal. In preferred embodiments, scuff band 40 is formed from three-quarter inch plywood or sixteen gauge galvanized steel corrugated to a one-quarter inch depth.

[0031] Referring again to Figure 2, exterior skin 21 is connected to top rail 18, bottom rail 22, end wall 26 and end frame 28. In one embodiment, outer skin 21 is constructed of "nominal" 050 aluminum, having a thickness of approximately 0.047 inches, and is fastened to vertical posts 36 by rivets or

other suitable means. Vertical posts 36 are riveted to the top and bottom rails of both side frames.

[0032] As shown in Figure 5, trailer floor 10 includes two longitudinally oriented zee-shaped members 70 (one of which is shown in Figure 5) between bottom rail 22 and longitudinally oriented wooden floor planks 74. The zee-shaped members and the floor planks sit on a plurality of transverse I-beams 72. Each I-beam 72 includes an end plate 73 welded to each end, and end plates 73 are fastened to a bottom portion of bottom rail 22. Wooden planks 74 may be held between opposing zee-shaped members 70 by friction, or the planks may be bolted or otherwise fastened to I-beams 72 and/or zee-shaped members 70. Zee-shaped members 70 may be intermittently attached to bottom rails 22, I-beams 72, and/or planks 74. Outer skin 21 is riveted to vertical posts 36, and posts 36 are riveted to bottom rail 22 and top rail 18, as shown at 76.

[0033] Referring now to Figure 6A, an exemplary post 36 includes a recessed lower portion 80 defined in front face 78. Stepped-down pairs of longitudinal flanges 88 and 82 extend out from opposite sides of front face 78 to outer edges 84 and 86 and are parallel to each other and to front face 78. Flanges 88 are recessed approximately one-quarter of an inch from front post face 78 and define lateral edges 87 at the transition to flanges 82. Flanges 88 and 82 are generally parallel to front

face 78. That is, they may deviate slightly from true parallel and/or may be discontinuous along their lengths, yet they are still able to receive and support liner panels (e.g. as shown in a three-flange embodiment in Figure 9) and/or compress in an accordion fashion as described herein and generally encompassed by the present invention, as should be understood by those skilled in the art.

[0034] Referring also to Figures 6B and 6D, each flange 82 extends continuously along the length of post 36. In contrast, flanges 88 are parallel to surface 78 and flanges 82 only above a transition section 90. Below transition section 90, flanges 88 bend outward away from the plane defined by front post face 78, allowing portion 80 to recess to a position approximately coplanar with the inward surface of flanges 88 above the transition section. A distance D1 (Figure 6D) between an exterior surface of the outer flanges and an interior facing surface of recessed portion 80 is approximately 0.37 inches in one embodiment.

[0035] Because flanges 82 maintain their positions across transition section 90, the movement of front face 78 inward to form recessed portion 80 pivots flanges 88 at edges 87, thereby forming a pair of angled surfaces 92. Edges 87 and post edges 84/86 remain straight and parallel to each other, and the indentation of recessed portion 80 does not expand the width of

post 36. Outer skin 21 may be attached to the post along the post's entire length, and the post may be attached both to the trailer's top and bottom rails, at the rear face of flanges 82 at 83.

[0036] Prior to the indentation of recessed portion 80, the post's cross-section is consistent along its entire length, as shown in Figure 6B. To form the recessed portion, and referring to Figure 6C, the lower portion of post 36 is disposed between an upper die piece 85 and a lower die piece 93. Die piece 85 may be forced toward piece 93 as indicated at 94, or die piece 93 may be forced toward die piece 85 as indicated at 96, thereby deforming the post's lower end as shown in Figure 6D. It should be understood that the post shapes may vary, and differing die configurations may therefore be used as appropriate.

Preferably, however, the post's stamped lower end defines a flat front outer surface and an accordion flange structure between the front face and the post's side edges. The die maintains the position of the side edges so that the accordion collapses as the die pushes in the selected portion of the front face. Accordingly, the post maintains a constant width while the recessed portion provides a surface for receipt of the scuff band.

[0037] When received by the recessed portion, at least a portion of the scuff band is disposed outward of the post front

face. Referring to Figures 5 and 9, the scuff band may be almost entirely outward of the trailer's interior area so that scuff band's front surface is substantially parallel to post front face 78 above transition section 90. Returning to Figures 6A-6D, flanges 88 above transition section 90 may receive inner liner panels 38 (Figure 2) against an abutting surface 102 so that the liner panels, post face 78 and the scuff band are substantially coplanar. That is, while there may be slight deviations in the surface, as should be understood in the art, the surface is coplanar from the standpoint of maximizing cargo space in the trailer.

[0038] It should be understood, however, that the scuff band may not necessarily be substantially coplanar with the trailer's inner side wall surface. For example, post portion 80 may be recessed by one-quarter inch but receive a half-inch thick scuff band. In this arrangement, only half the scuff band is outward of the inner side wall. Thus, the scuff band front face is inward of the inner side wall, but the recessed post nevertheless saves a quarter inch at each wall.

[0039] Furthermore, the scuff band may be disposed at any suitable position in the wall. Referring to Figure 10, for example, scuff bands are disposed at the top and bottom of the wall, and the posts define recessed portions (not shown) at both ends. Moreover, the posts may be recessed wherever it is

desired to place scuff bands, and the posts may be recessed at one or more intermediate points to receive one or more scuff bands.

[0040] The horizontal logistic tracks illustrated in Figure 4 receive the liner panels so that the panels are generally coplanar with the front faces of the tracks. The scuff band may be disposed below the liner panels within recessed portions in the vertical posts so that the panels, logistic tracks and scuff band form a substantially uniform surface.

[0041] It should be understood that the present invention encompasses various post configurations. Referring now to Figure 7A, for example, post 36A is generally hat shaped and includes a front face 78 and three stepped-down longitudinal flanges on either side of the front face. A pair of flanges 54A extend outward from the front face, followed by flanges 88A and 82A. A plywood interior liner panel 38 is fastened to post 36A at first inner flanges 88A by tapit pins 66 so that an interior facing surface of panel 38 is substantially coplanar with front face 78. The heads of tapit pins 66 may extend out from this surface but could also be countersunk in the liner panels so that the heads are at or below the panel surfaces. Outer skin 21 is attached to rear faces of flanges 82A at 99.

[0042] Referring now to Figure 7B (and Figure 9), post 36B includes three flanges 82B, 88B, and 54B in a configuration

similar to post 36A, but interior side wall liner panels 38B are of a metallic construction. Each metallic inner side wall liner panel defines a main body portion 39, which is corrugated by a series of parallel recesses 48 (Figure 8), and flanges 52 that rest on flanges 54B. Screws 56 fasten flanges 52 to the flanges. In one preferred embodiment, as shown in Figure 8, recessed channels 48 form a trapezoidal shaped depression in panel main body portion 39 and include opposing sides defining an angle of approximately 45 degrees with respect to a plane defined by an interior facing surface of the panel.

[0043] Flanges 52 in a preferred embodiment extend approximately one half inch from liner panel main body portion 39 to the panel's side edge. Liner flanges 52 may be formed by folding back a portion of the liner panel so that the thickness of panel flanges 52 is double the thickness of the main panel body. The width of panel flanges 52 may vary in accordance with the particular post design.

[0044] Referring to Figure 7C, post 36C includes three stepped-down planar flanges behind post front face 78. A pair of outer flanges 110 extend inward from edges 84C and 86C. A pair of first inner flanges 112 are defined between outer flanges 110 and a pair of second inner flanges 114. Metallic interior side wall liner panels 38 are screwed to post 36C at second inner flanges 114. An adhesive sealant may be applied

between outer flanges 110 and a rear face 108 of recessed channels 48. Referring also to Figure 7B, an adhesive sealant could also be used between channel rear face 108 and first inner flanges 88B.

[0045] In the embodiments illustrated in Figures 7A-7B, the post's rearwardmost planar surface is defined on an exterior surface of outer flanges 82A-B and is adjacent to post edges 84 and 86. In these embodiments, outer skin 21 (shown in phantom on Figures 7A-7D) attaches to outer flanges 82A-B at 99. In the embodiments illustrated in Figures 7C and 7D, however, outer skin 21 fastens to an exterior surface of first inner flanges 112. Thus, it should be understood that the present invention encompasses any suitable lateral position of the flanges.

[0046] Referring to Figure 7D, post 36D is configured similarly to post 36C, but it receives a plywood interior side wall liner panel 38 fastened to outer flanges 110 by tapit pins 66. Plywood panels 38 are approximately one quarter of an inch in thickness.

[0047] While one or more preferred embodiments of the invention have been described above, it should be understood that any and all equivalent realizations of the present invention are included within the scope and spirit thereof. The embodiments depicted are presented by way of example only and are not intended as limitations upon the present invention.

Thus, it should be understood by those of ordinary skill in this art that the present invention is not limited to these embodiments since modifications can be made. Therefore it is contemplated that any and all such embodiments are included in the present invention as may fall within the literal and equivalent scope of the appended claims.